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(54) **HAND HELD, VOLUMETRIC MULTI MATERIAL DISPENSER**

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B67D 3/00 (2006.01)

(52) **U.S. Cl.**
CPC ***B67D 3/0045*** (2013.01); ***B67D 3/0012*** (2013.01)

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CPC B67D 3/0045; B67D 3/0012; B67D 7/70; B65D 88/54; G01F 11/00; B01F 2215/995; B01F 13/002; B01F 13/1058; B01F 15/0237
USPC 222/135, 142.6–142.9, 144.5, 145.7, 137, 222/134, 145.5, 145.3, 145.1, 282, 287, 222/288; 604/187, 191, 207, 208, 211, 604/218
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,353,716	A *	11/1967	Fuchs, Jr.	B67D 7/741 222/132
3,718,234	A *	2/1973	Bagguley	B65D 83/384 222/135
4,392,589	A *	7/1983	Herold	A61C 5/64 222/137
5,429,276	A *	7/1995	Esclar	B01F 5/0685 222/1
6,464,107	B1 *	10/2002	Brugger	B05B 11/3056 222/134
8,651,338	B2 *	2/2014	Leak	A61M 5/19 222/309
9,346,069	B2 *	5/2016	Holzmann	B05B 11/3056
9,402,961	B2 *	8/2016	Leak	A61M 5/31525
10,584,023	B2 *	3/2020	Beyda	B67D 3/0064
10,602,830	B2 *	3/2020	Giron	B01F 5/0641
2012/0031925	A1 *	2/2012	Greenberg	B65D 83/68 222/135

(Continued)

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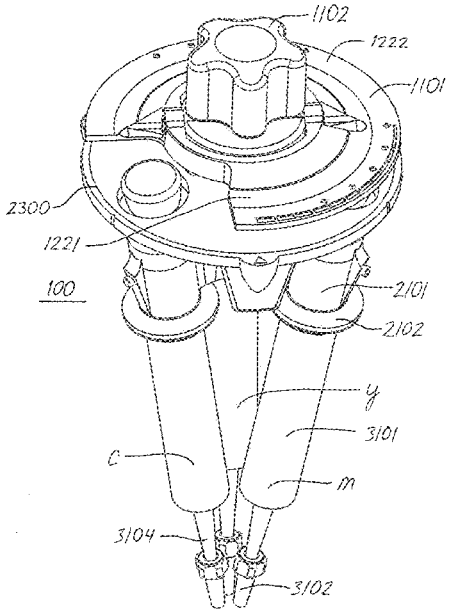
(57) **ABSTRACT**

A fluid dispenser which enables one or two liquid mixture components to be selectively or simultaneously dispensed via a manually operable selection and actuation means. The said dispenser incorporates a body, one or more fluid storage and delivery channels, a selection and actuation disc operable to cause the release of a quantity of a stored fluid, as well as articulation and clamping means which support the said disc. One or more of the said fluid channels may be urged by said disc via cams to eject a fluid or fluids from corresponding cartridges. The present device provides a scale and pointer system which permits selection of a particular volume of a fluid for ejection in a first mode of operation, or selection of a specified mutual proportion of two fluids for ejection in a second mode of operation.

7 Claims, 6 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

2012/0241472	A1*	9/2012	Nilov	F04B 9/14 222/95
2012/0298694	A1*	11/2012	Holzmann	B05B 11/3095 222/135
2018/0056312	A1*	3/2018	Hou	B05B 15/70

* cited by examiner

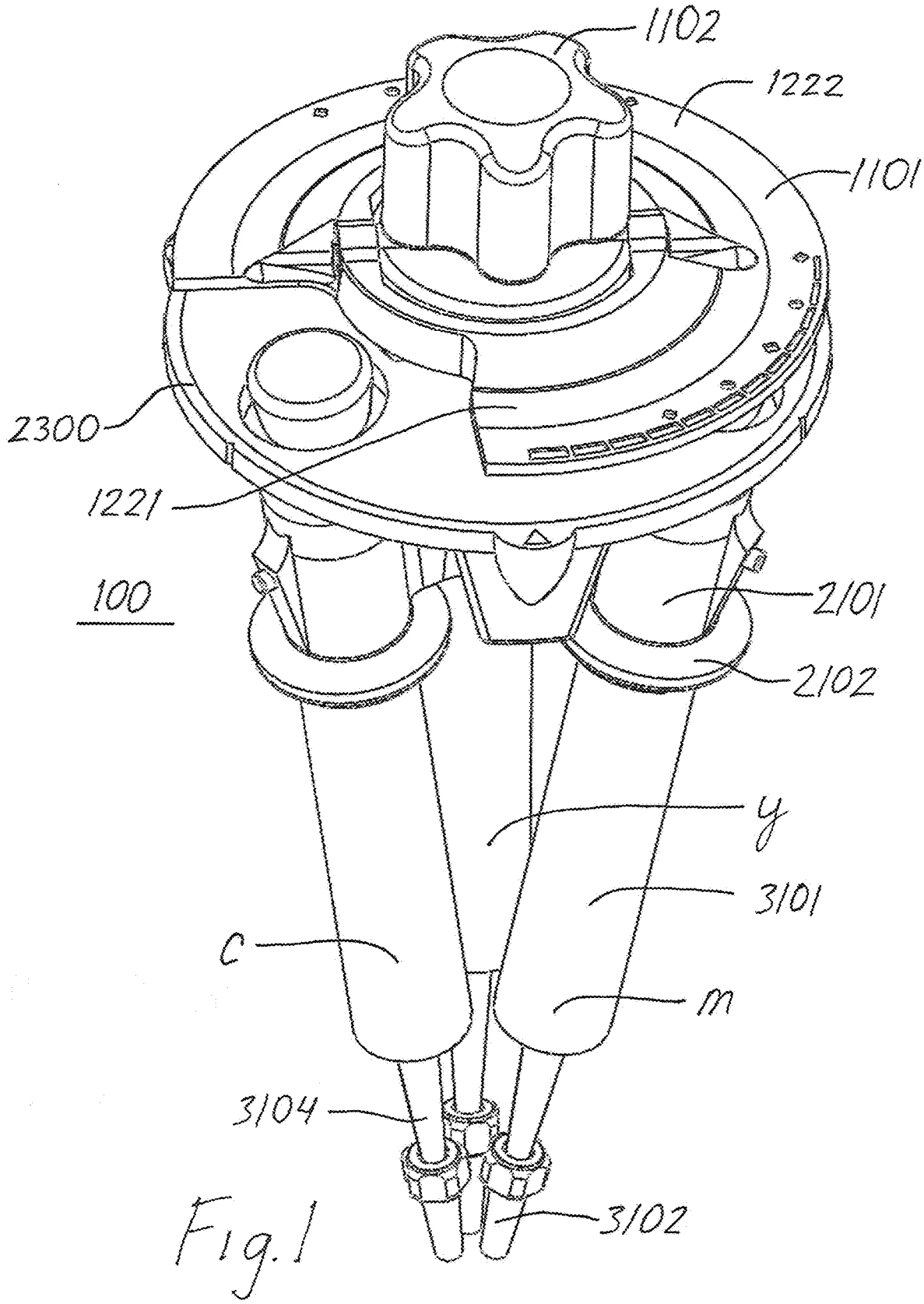


Fig. 1

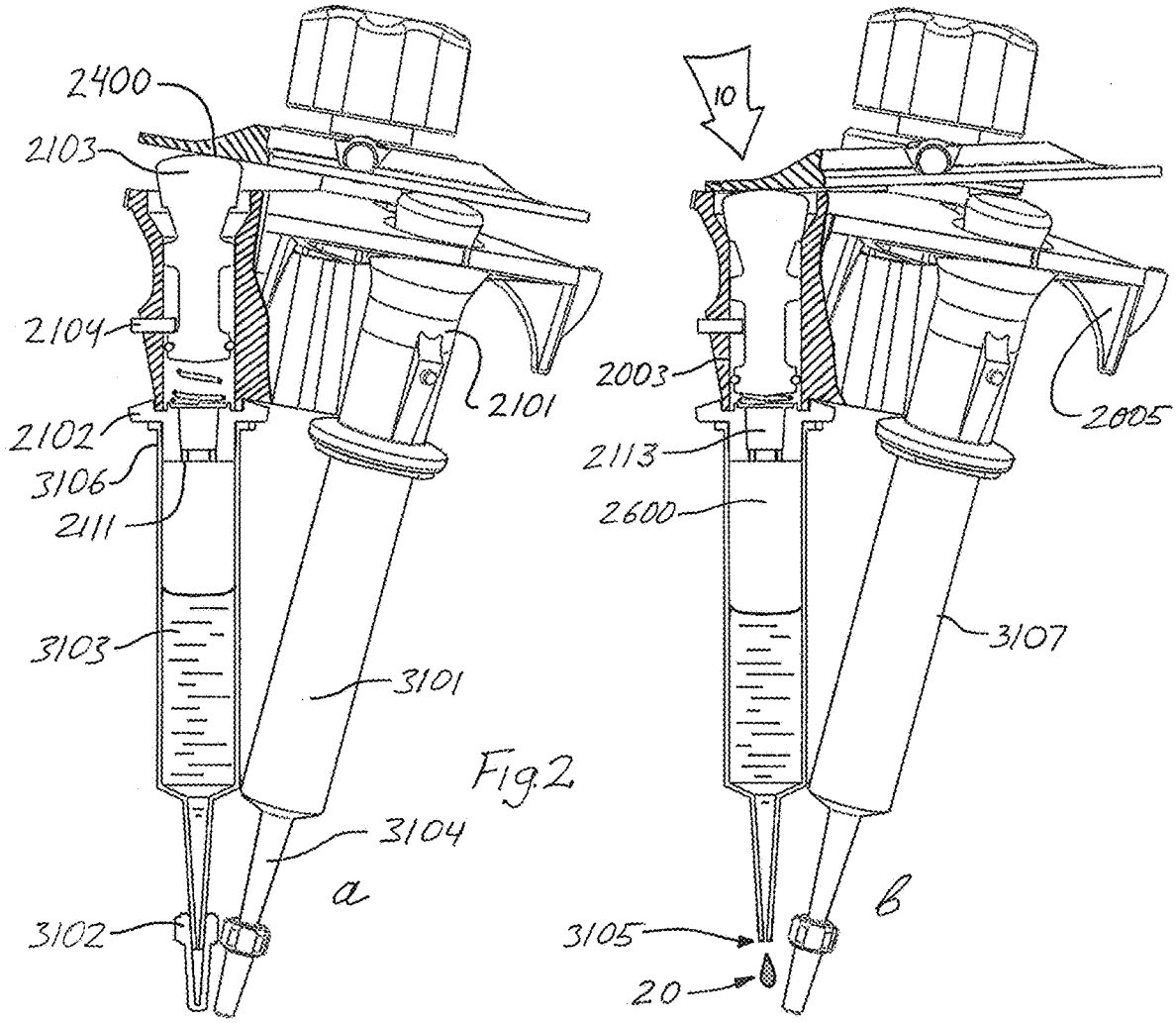

2400
2103
2104
2102
3106
2111
3103
2101
3101
3104
3102
a
10
2003
2113
2600
2005
3107
3105
20
b

Fig.2

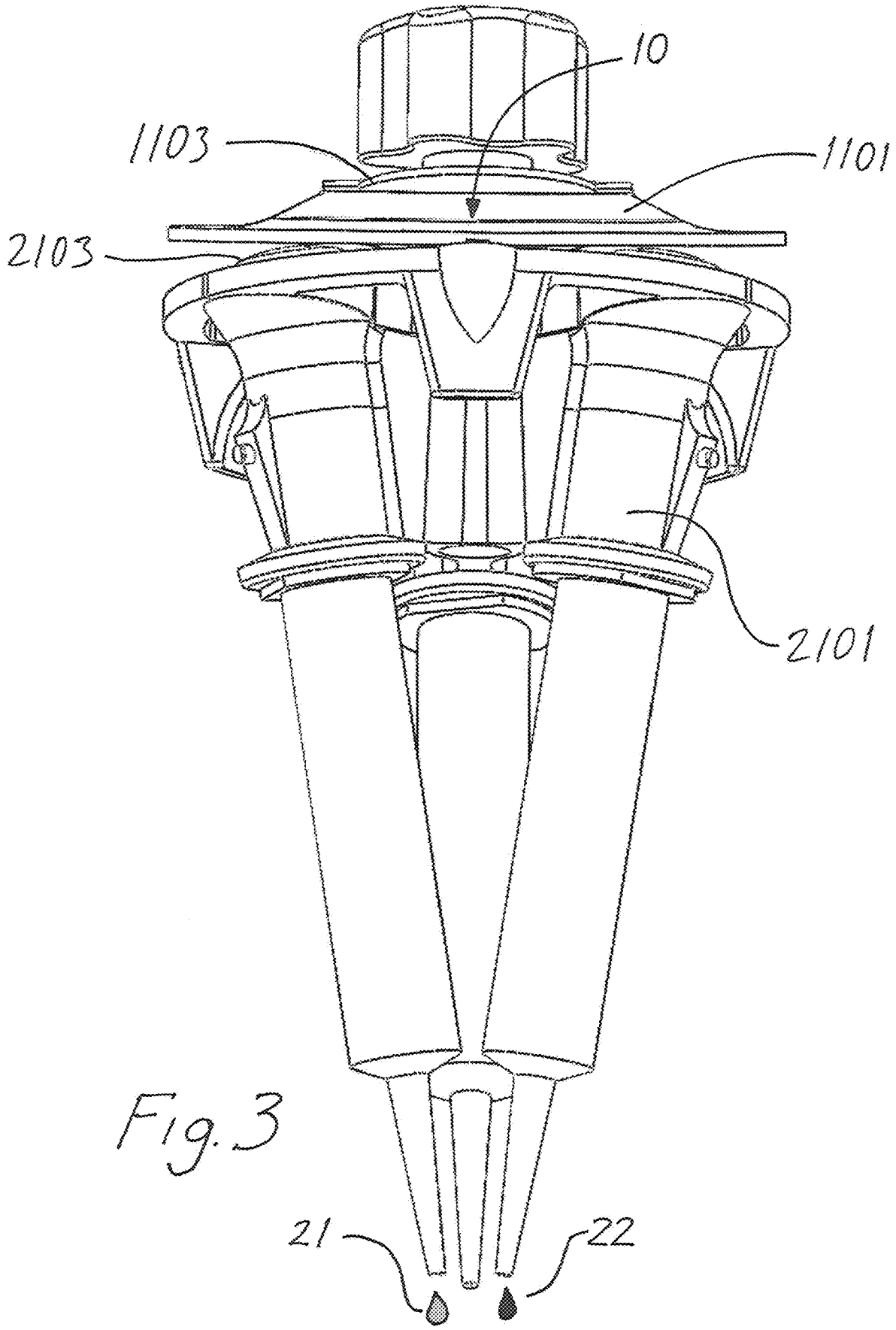


Fig. 3

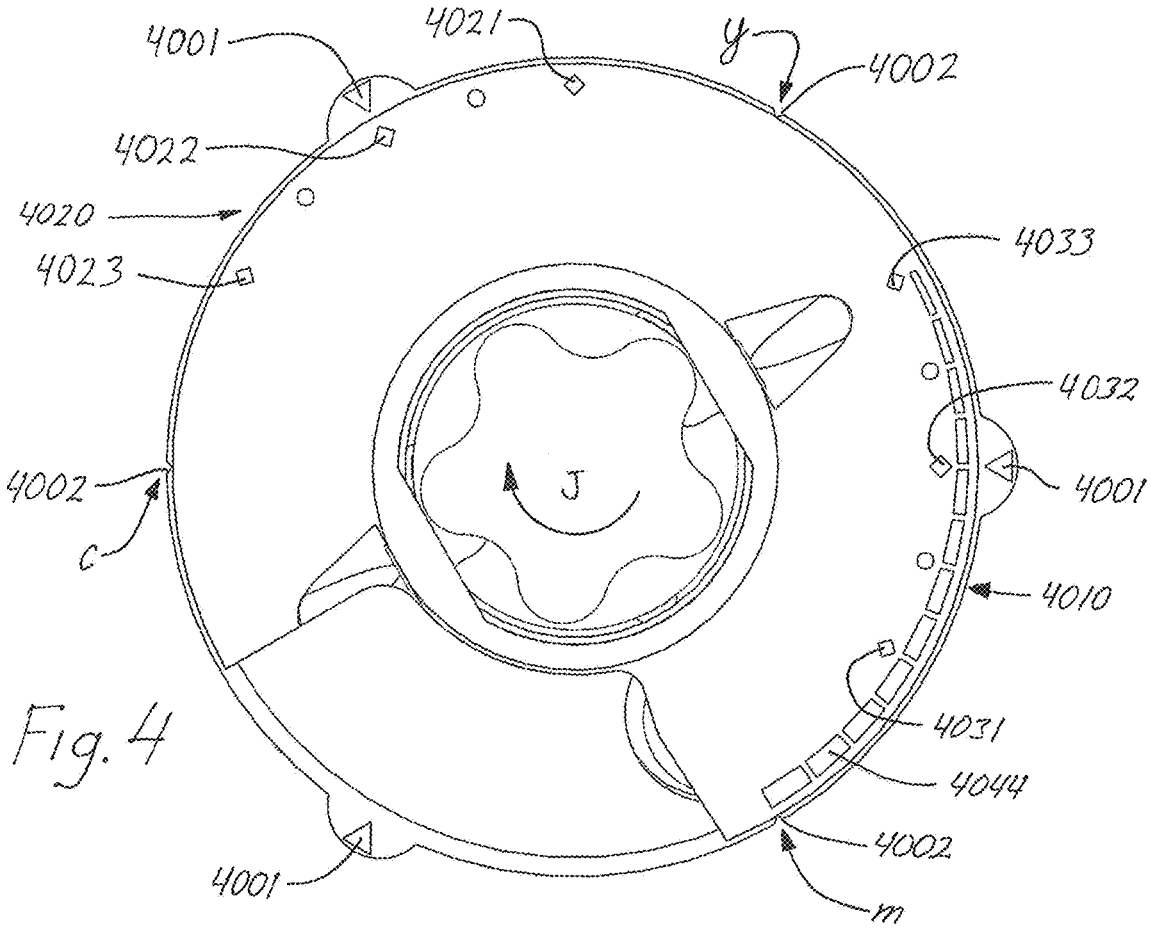

4001
4021
y
4002
4022
4020
4033
4023
4032
4002
4001
c
J
4010
4031
4044
4002
4001
m

Fig. 4

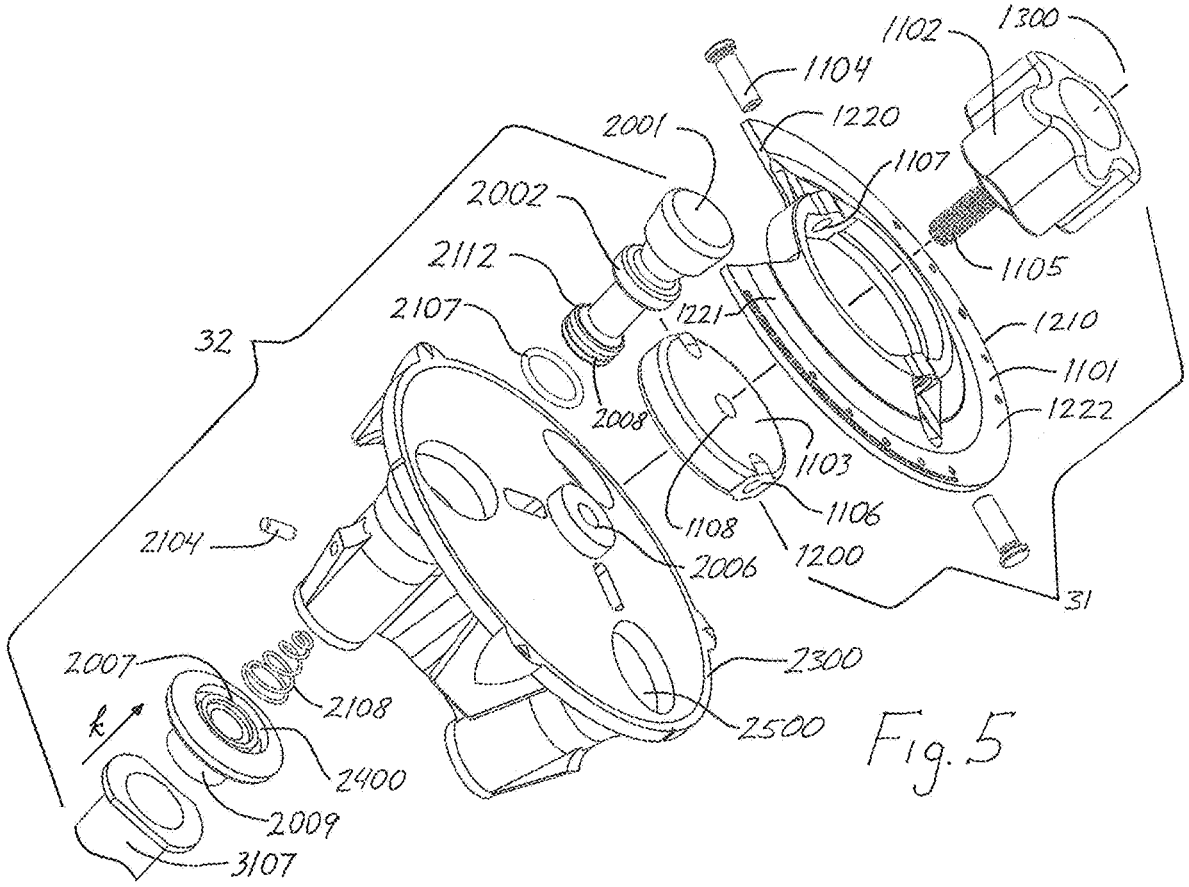

1102
1300
1104
1220
2001
1107
2002
2112
1105
2107
1221
1210
32
1101
1222
2008
1103
1106
1108
1200
2104
2006
31
2007
2300
2108
2500
2400
2009
3107

Fig. 5

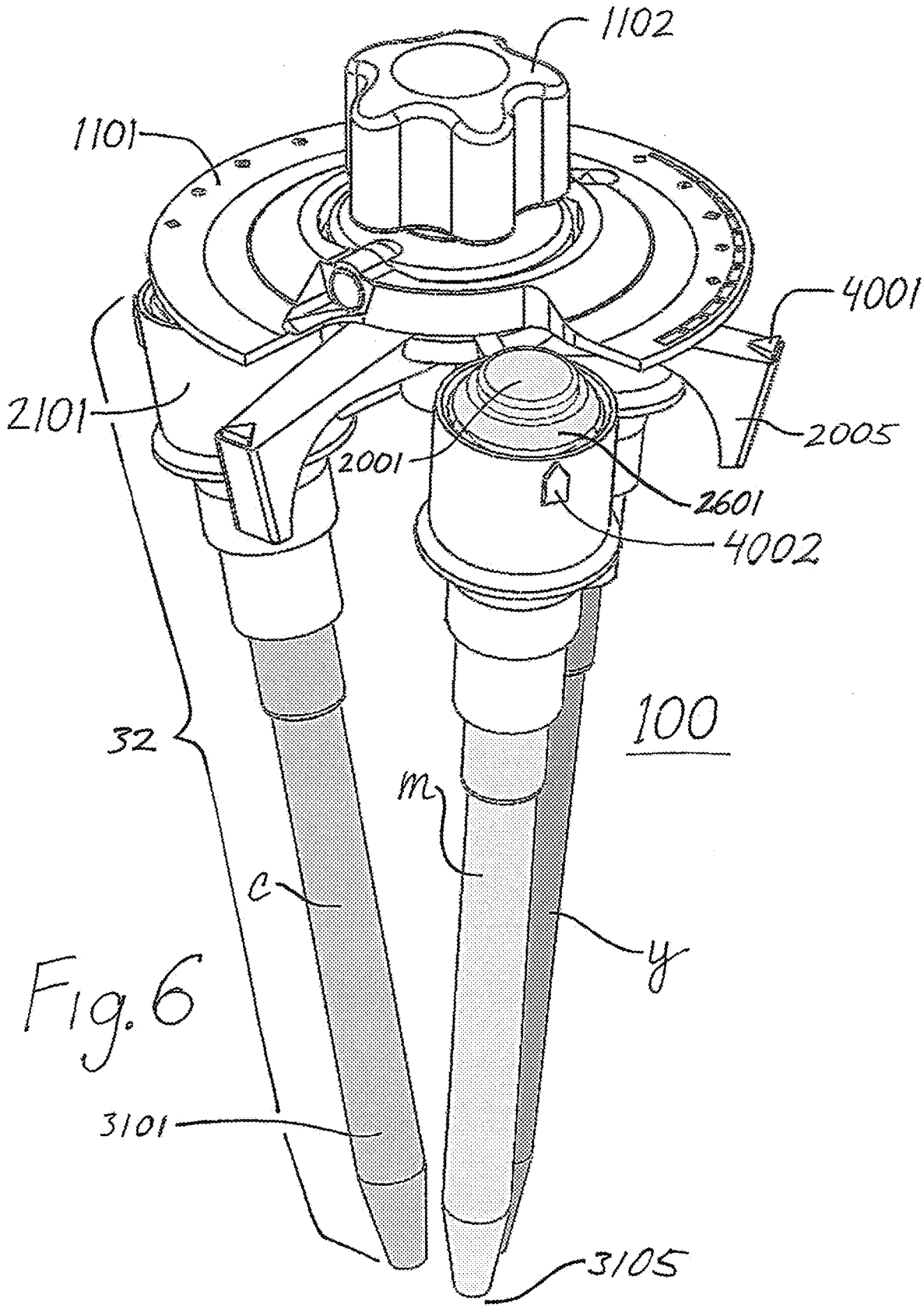


Fig. 6

HAND HELD, VOLUMETRIC MULTI MATERIAL DISPENSER

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application claims the benefit of U.S. Provisional Patent Application No. 62/770,816, filed Nov. 22, 2018, which is incorporated by reference herein in its entirety.

BACKGROUND OF INVENTION

a. Field of Invention

The invention relates generally to multi chambered dispensing devices capable of metering or proportioning the dispensed fluids. Particularly, the invention relates to a compact fluid dispenser capable of ejecting variable fluid volumes in response to operation of the dispenser, which is preferably by suitable manually applied force on a gimbaled selection and actuation disc.

b. Background of Invention

Visual artists may want to formulate color mixtures quickly and accurately, in order to be more productive in the often delicate, sequential and manual metering of paints. Through iterative use of the current dispenser, a mixture with any number or components in any proportion to each other may be produced. Disclosed herein is a volumetric dispenser which can repeatably produce specific fluid component formulations in response to actuation of an articulated selection and actuation disc, preferably by a manual depression of said disc.

c. Description of Related Art

Fluid dispensers which form a mixture from individual fluid components are known and are taught by Max Lieber's U.S. Pat. No. 6,527,201, by F. J. Fuchs Jr's U.S. Pat. No. 3,353,716, and by Girair Hagop Alticosalian's U.S. Pat. No. 4,006,841.

The above prior art devices are generally portable. Lieber's color changer requires a pneumatic power source to operate. This device generally has limitations in artistic exploitation because it can deliver only two colors simultaneously. Designed to deliver paint to an airbrush for real-time consumption, it constrains the visual appearance of the delivered mixture to narrow areas of the color gamut. For example, it cannot simultaneously deliver a mixture of light grey derived from a black and a white component together with a yellow component.

Fuchs Jr.'s device enables incremental mixture formation by manually actuating control knobs which correspond to particular fluid mixture components in order to dispense each fluid. The lack of proliferation and acceptance of this device today may be attributed to the number of parts it includes and the corresponding complexity of its manufacture. Paints may be viscous, non lubricating and may have high pigment loads. It is possible that F. J. Fuchs' device is prone to mechanical jamming of components which are in sliding contact with each other and are exposed to paint.

Alticosalian's dispenser allows for dispensing of as many as two fluids simultaneously from rigid pressurized containers via an arrangement of cams, valves and a shared fluid manifold. This device allows one to select a ratio between two fluids via a rotary knob. Dispensing of stored fluids is actuated by a manual depression of said knob. This device has marked disadvantages if used to dispense paints. It is not a volumetric dispenser, and appears to be semi stochastic in operation. A pressurized container is known to eject varying amounts of fluid in response to a given valve position over time. Pressurized containers are also known to begin dispensing with a surge of material. Furthermore, the prescribed central manifold may need cleaning upon fluid container replacement or color changes. A further disadvantage is the relative difficulty of refilling the advised pressurized containers in a home or studio setting. Finally, due to absence of means to clamp or secure the selected ratio during dispensing, mechanical flutter and inherent forces of dispensing may inadvertently alter the user selection, compromising repeatability and stability of the mixture produced by the device in question.

Notwithstanding the prior art, the present invention is neither taught nor rendered obvious thereby.

d. Objects and Advantages

An objective of the current invention is a compact, hand powered device that can store and meter out fluids simultaneously or sequentially.

Another objective of the current invention is to leverage artists' existing knowledge of a color wheel. To that end, device **100** includes three fluid paint stores c, m, y which may respectively contain Cyan, Magenta and Yellow, and are arranged in the notional positions of primary colors on a color wheel. The said fluid stores are located at equal lengths along periphery **2300** of body shell **2101** around a common axis **1300**. In using the current invention, an operator may select any ratio of a first color component to a second component for dispensing.

Advantageously, the current invention accomodates a need to work with dozens of kinds of fluid materials. In airbrushing, for example, opaque and translucent paints, mediums, and paint reducers are used. A multitude of mediums and varnishes may be used with brushed-on acrylics. In anticipation of frequent changes of cartridges **3107**, male-taper fittings **2009** are provided for coupling the said cartridges to dispenser **100**. Because such Luer connections are generally easy to make and break, the said cartridges may be removed or installed with minimal operator effort using the said surfaces **2009**.

The current device lends itself well to devising a catalog of the colors which it can produce because the user can specify fluid proportions incrementally using a scale and pointer system provided on the control disc and the device body. In one implementation of such a catalog, a set of mutually compatible and generic pigments is chosen in order to index their visual properties. Such a set may comprise of Cerulean Blue, Quinacridone Magenta, Cadmium Yellow, Titanium White, and Carbon Black. The resulting catalog may provide color codes, corresponding color samples, and relevant ratio or volume selections which may produce the said colors.

Another important object of the current invention is a valveless device which requires minimal maintenance and cleaning. Paints do not contact or wet any moving parts of the currently taught device. The only component which paints may contact is a disposable cartridge means **3107**. The said cartridge means, preferably a syringe casing, can be cleaned and retained for future use.

Finally, the current invention provides clamping means to securely retain a selected dispensing ratio or volume.

SUMMARY OF INVENTION

The present invention relates to a fluid paint dispenser which enables the user to select from a plurality of mixture components prior to dispensing, for production of a wide variety of mixtures having different visual or other properties. The invention taught herein comprises of an articulated selection and actuation assembly **31**, a plurality of fluid storage and delivery channels **32** arranged around a central axis **1300**, and a main body **2101** to which the said assemblies **32** and **31** mount.

A threaded bore **2006** on main body **2101** is provided for mounting the said selection and actuation assembly **31**, which comprises a selection and actuation disc **1101**, a center block **1103**, a rotary clamping bolt **1105** with integral hand grip **1102**, and pins **1104** which secure the said disc to the said center block **1103**. The said bore **2006**, central to the main body and co-axial with axis **1300**, receives a bolt **1105** integral to the said clamp means. Pins **1104** mount the said disc **1101** to the center block allowing it to rotate about an axis **1200**. The said clamp bolt **1105** mounts the center block to the main body, allowing it to rotate about an axis **1300**. In summary, the gimbaled assembly **31** provides mutually perpendicular rotary and tilt axes **1300** and **1200** about which said disc **1101** may articulate.

Selection and actuation disc **1101** may rotate with gimbal hub **1103**, and during such rotation or when idle, may glide or rest on some or all of the piston cams **2001**. Upon manual depression of said disc **1101** by the operator, in the vicinity and direction shown by arrow **10** in drawing **2**, the said disc exerts a torque on pistons **2103** via their cam surfaces **2001** thereby also depressing the said pistons. The configuration of said disc **1101**, said axes **1300** and **1200**, and said piston cams **2001** is such that at most two piston cams **2001** may contact and follow said disc **1101** during an operator imparted actuation or tilting of disc **1101**.

The rotary clamp **1102** is actuated by turning its handle in direction J, and when so engaged, resists flutter of the said disc **1101** relative to the body shell **2101** during dispensing. Another benefit of clamp **1102** is the retention of a prior dispensing selection until it is disengaged by operator. The said clamp may be disengaged by rotating handle in the opposite direction to that indicated by J.

Disc **1101** features upon it a graduated scale **4020** for selecting and dispensing two mixture components simultaneously at a specified ratio to each other, and a scale **4010** for dispensing variable volumes of a single mixture component. Each of the said scales corresponds with its particular set of indicators on the body shell **2101** and in concert allow the user to specify ratios or volumes of mixture components.

A dual component scale **4020** includes a series of graduated marks each denoting a certain proportion of a first to a second mixture component. The proportion graduations include marks **4021**, **4022**, and **4023** which may correspond to selectable ratios 1:29, 1:1 and 29:1, of a first to a second fluid. Said scale **4020** cooperates with proportion indicator markings **4001** located between fluid stores c, m, y and spaced at equal distances along rim **2300**.

By rotating the said disc and bringing a desired ratio on its dual component scale **4020** to correspond with any one of the arrow indicators **4001** on the body shell **2101**, engaging clamp **1102** and then depressing the disc above the said arrow **4001**, the respective fluids from the fluid stores immediately flanking the particular indicator **4001** may be dispensed at the ratio indicated on scale **4020**. In this manner, any two of the fluid components c, m, and y may be selected for simultaneous dispensing at a predetermined ratio.

A variable volume shot of a single kind of fluid may also be dispensed by the present invention. This feature may be used to modify an existing mixture with a single new fluid component. Single component scale **4010** comprises of a volumetric and a proportional series of graduations. The volumetric graduation elements **4044** are each equivalent to two 0.04 ml drops of fluid. Preferably, the said graduations **4044** are each rendered relatively smaller where a cumulatively lower volume is denoted, and are rendered relatively larger where there is a higher volume denoted. The said scale also features the proportional markings **4031**, **4032**, and **4033**. Said scale **4010** cooperates with volume indicators **4002** located above fluid stores c, m, y and spaced at equal distances along rim **2300**.

By rotating the selection and actuation disc **1101** and bringing a desired volume on its single component metering scale **4010** to correspond with the inset volume indicator **4002** on body shell **2101**, engaging clamp **1102**, then depressing the disc above indicator **4002**, fluid in a cartridge under said indicator **4002** is caused to be ejected from an orifice **3105** of the same cartridge.

Each of the said channels **32** comprises of a cylindrical bore **2003** in communication with a fluid storage cartridge **3107**, a quick release fitting **2102**, a spring **2108**, an end stop means **2104**, and a piston **2103** slidably mounted in the said cylindrical bore. The main body **2101** preferably directly incorporates three said bores **2003** which each in turn accepting fitting **2102**. The said fitting **2102** is in communication with the said fluid cartridge **3107** via bore **2113** as well as a multitude of considerably smaller apertures **2111**. The said apertures **2111** serve to screen or protect the said piston and bore mechanism from contamination by the stored fluids during dispensing operation.

Functionally, each channel **32** is capable of ejecting a fluid volume corresponding to a linear displacement of its piston **2103**. In one alternative implementation shown in FIG. **6**, where each fluid channel is embodied by a disposable pipette, a fluid volume may be ejected upon compression of a particular pipette's bellows or perhaps bulb element.

The current device functions best when held upright with the clamp **1102** oriented away from the ground. The fluids **3103** held in the said cartridges **3107** must substantially cover cartridge orifices **3105** in order to be ejected in a controlled manner afforded by the current invention.

When no actuation forces act on the said piston **2103**, the spring **2108** causes it to retract to a starting position where it is detained by pin **2104**. Upon retraction of the said piston, air is caused to aspirate into the corresponding fluid cartridge **3107** until pressure in the said cartridge is in equilibrium with atmospheric pressure.

Prior to use of device **100**, at least one cartridge **3107** must be filled with a fluid and pushed onto tapered surface **2009** of press-fit fitting **2102** as indicated by arrow kin FIG. **5** of the drawings. A female plug **3102** or a common push pin may be used for blocking cartridge orifice **3105** during the said filling operation and said push-on installation. It is advisable that elastomeric squeeze bottles with a tapered tip be used for the filling of cartridges. Such bottles may allow the user to orient and direct the flow of the new material and thereby to avoid contamination of the cartridge port **3106**.

Prior to installation of cartridge means **3107**, the piston in communication with said cartridge may be manually

depressed, so as to relieve any pressure build-up caused inherently by the cartridge installation process. Upon fitment of the said cartridge to device **100**, the piston is released and the cartridge is uncapped by operator.

Additional features, advantages, and embodiments of the invention may be set forth or apparent from consideration of the following detailed description. Moreover, it is to be understood that both the foregoing summary of the invention and the following detailed description are exemplary and intended to provide further explanation without limiting the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate preferred embodiments of the invention and together with the detailed description serve to explain the principles of the invention. In the drawings:

FIG. **1** is a general three quarters view of the fluid delivery device **100**;

FIG. **2** is a partial cutaway of the fluid delivery device **100**;

FIG. **3** shows a view of the fluid delivery device **100** mid-cycle during simultaneous fluid dispensing;

FIG. **4** is a top view of fluid delivery device **100** showing scale and pointer markings;

FIG. **5** is an exploded view of the fluid delivery device **100**;

FIG. **6** is a general three quarters view of an alternative embodiment of device **100**;

DETAILED DESCRIPTION OF THE EMBODIMENTS

With reference to the drawings, a dispenser **100** is shown in accordance with an example embodiment and includes a number of components and assemblies that together provide various operational modes for selecting and dispensing a pair of liquids proportionally, or dispensing a single liquid individually, and include but are not limited to, a gimballed selection disc assembly **31**, a main body **2101**, one or more fluid storage and delivery channels **32**, and a set of scale and indicator systems **4010** and **4020**.

Referring to FIG. **5**, a gimbal center block **1103** is mounted atop main body **2101** via a screw **1105** integral to clamping handle **1102**, which passes through bore **1108** of said center block **1103** and engages a threaded central bore **2006** of the said main body **2101**. The selector actuator disc **1101** mounts to gimbal center block **1103** via pins **1104** passing through bores **1107** and **1106** and may tilt on axis **1200** formed by said pins. The bolt **1105** provides a rotary axis **1300** about which the center block **1103** and disc **1101** mounted thereon may pivot.

In the current embodiment of dispenser **100**, selection and actuation disc **1101** is bisected by tilt axis **1200**, thereby forming a first section **1221** and a second section **1222**. The said first section **1221** of said disc **1101** bears a cutaway **1220** which prevents overlap of more than one piston cam **2001** by said section's available net contact area. Thus the said cutaway **1220** permits selection of and dispensing of at most one mixture component c, m, or y from device **100** when an actuating force acts upon the the said first section **1221**. Section **1222** of disc **1101** is capable of actuating two pistons simultaneously when it covers or overlaps two cam poles **2400** of the said pistons. Disc section **1221** carries upon it a single component scale **4010**, and disc section **1222** carries upon it a dual component scale **4020**.

Turning to FIGS. **1**, **2**, and **5**, we find a fluid storage and delivery channel comprising of a fluid storage cartridge **3107**, a quick release fitting **2102**, a spring **2108**, an end stop means **2104**, and a piston **2103** slidably mounted in a cylindrical bore **2003**. The said bore **2003** is preferably formed in main body **2101**, and is in fluid communication with an interchangeable cartridge **3107** via fluid pathways **2111** and **2113** of fitting **2102**. Each piston's bearing **2002** and piston head **2112** are in frictional contact with bore **2003**. The piston seal **2107** is installed in groove **2008** on piston head **2112**. Piston **2103**, piston bore **2003**, piston seal **2107**, fluid passages **2111** and **2113**, and cartridge **3107** define a variable volume **2600** which may be reduced when movement is imposed upon piston **2103** by actuation and selection means **31**.

Each fluid channel assembly **32** is arranged along the periphery **1210** of the selection and actuation disc **1101** at equal intervals in order to maximize any motion imparted to pistons during a stroke of said disc **1101**. The said fluid channel means **32** are arranged symmetrically about axis **1300**. One or more of the piston cams **2001**, disposed at a substantially tangential orientation to said disc **1101**, may maintain positive contact with disc **1101** througout a dispense cycle.

Diaphragms, bellows, and rubber bulbs are widely used for pippetting or transferring fluids. The said rubber bulbs generally interoperate with pipette bodies, and disposable pipettes often feature an integrated bellows or bulb. These devices functionally provide similar utility to the presently taught fluid channel **32**, and can similarly eject fluid from a storage means volumetrically, in a controlled manner.

As illustrated in FIG. **6**, a bellows pipette may comprise one alternative to the presently taught piston, cylinder and cartridge arrangement and can provide a compliant variable volume **2601** analogous to volume **2600**, as well as an integrated fluid store c, and present a simplified fluid delivery channel **32**. Bellows pipettes may provide an integral cam surface **2001** for interacting with selection and actuation disc **1101**, and a fluid storage volume **3101** equipped with an ejection orifice or tip **3105**.

Those skilled in the art shall know how to incorporate the said various alternative fluid delivery and storage devices into the present invention **100**. Drawing **6** shows an example of an alternate embodiment which uses a disposable pipette as a fluid storage and delivery means.

The current device offers some design freedom in the packaging of the collapsible volume such as a bellows or diaphragm with the implementer's preferred fluid store or cartridge. A pneumatic conduit must link the two said volumes. Thus, should the implementer choose a discrete bellows as a collapsible element, it is highly advantageous to install an internal spring within the said element in order to speed expansion of its form after dispensing and to prevent unwanted or sporadic collapse of the said element's volume due to the weight of the stored fluid and the associated negative pressure exerted internally on the said collapsible volume. Preferably, a helical compression spring is installed along the axis of compression of the designer's preferred collapsible element.

In FIG. **2**, drawing a, the selection and actuation disc **1101**, piston **2103** and spring **2108** are shown in their initial as well as final positions in a dispense cycle. In FIG. **2**, drawing b, the same elements are shown at the mid-point in the dispense cycle, when the selected fluids have been ejected. In operation, at least one piston **2103** is caused to

travel in a piston bore **2003** towards a fitting element **2102** terminating said bore, to an extent determined by the rotary position of the gimbal hub and an inclination of the said disc **1101**. The user may manually depress said disc **1101** in the vicinity of and in the direction indicated by arrow **10** to affect dispensing of one or more stored fluid **3103**. The tilting of selection disc **1101** on axis **1200** may then proceed until the top surface **2110** of body shell **2101** is contacted by said disc. During such a stroke, air pressure increases in constrained volume **2600** as piston **2103** is displaced by disc **1101** towards cartridge **3107**, causing the said cartridge to eject fluid. In its travel, piston **2103** compresses spring **2108**, which serves to return the said piston to its initial or resting position at the end of an actuation stroke. Upon retraction of said piston, air may be aspirated into syringe main body **3103** via tapered tip **3104**, in order to replace the ejected fluid. Once said ejected fluid is replaced with air, a dispense cycle is understood to be complete.

In reference to FIGS. **2** and **5**, springs **2108** are received by a spring seat **2007** of each fitting **2102**. If piston **2103** is caused to travel towards fitting **2102**, spring **2108** will be compressed, and able to exert sufficient force to return piston **2103** to an initial position determined by end-stop pin **2104**. Pins **2104** in concert with springs **2108** establish initial or at-rest positions of pistons **2103**.

Functionally the bearing **2002** stabilizes the piston and resists lateral forces imparted on it by selection and actuation means **31**, which may cause binding of bearing **2002** to its bore **2004** during operation of device **100**. Those skilled in the art will know how to implement bearing **2002**. The fitting **2102** mates to the main body **2101** via a relief groove **2400** and spring seat rim **2007**. Spring seat rim **2007** is accepted by piston bore **2003** for alignment. Preferably the elements **2101** and **2102** are bonded with glue.

Seal **2107** aids in defining variable volume **2600**. The seal is preferably produced from a PTFE enhanced elastomer. Substantial chemical resistance of seal **2107** to lubricants is important to the current embodiment. It is advised to maintain lubrication of the said sliding seal **2107**

The current embodiment favors a disposable syringe casing **3107** with an integral tapered tip **3104** as a fluid store. Tapered tip **3104** allows for smooth aspiration of air back into the syringe after a volume of fluid is ejected. To facilitate unimpeded transit of air into the main casing upon piston **2103** retraction, a syringe casing with a smooth and contiguous interior surface is preferable.

The tips **3104** of the fluid stores **3101** are preferably arranged in substantially close proximity to each other, in order to dispense the stored fluids into a relatively small receptacle or container. It is preferred that the piston cams **2001** are situated as close to the periphery **2300** of device **100** as possible, in order to increase the distance over which any tilting of the selection and actuation disc **1101** may interact with the said cams.

The invention claimed is:

1. A fluid dispensing device for delivering one or more fluids, comprising a main body adapted for mounting or incorporating one or more fluid delivery channels;

a fluid volume selection and actuation means mounted to said main body and operable to cause the release of a desired quantity of a fluid or fluids from the said one or more fluid delivery channels;

wherein the said selection and actuation means is rotatable in relation to the said main body on one axis in order to specify a fluid volume or volumes to eject, and tiltable relative to the said body on another axis in order to effect the ejection of fluid from the one or more of the fluid channels; and

wherein the said volume selection and actuation means can be fixed in place by the provided clamp bolt or clamping means;

at least one fluid delivery channel having a fluid storage or cartridge equipped with at least a fluid ejection port and a control port or orifice;

a normally expanded, collapsible piston which exposes a control cam surface and is in fluid communication with said cartridge; wherein the said cam surface is at rest situated in close proximity to the selection and actuation means, so that upon displacement of the selection and actuation means, said piston may be collapsed via said cam surface.

2. A fluid dispensing device as claimed in claim **1**, wherein the selection and actuation means is symmetrically bisected into a first and a second section by a tilt axis, and the first section bears a cutaway which prevents its available contact area from contacting plural control cams, thereby guaranteeing that only one fluid may be dispensed should the said section be depressed to effect the ejection of fluid.

3. A selection and actuation disc as claimed in claim **2**, wherein the second section is a non-cutaway section, which bears a ratio-metric proportion scale denoting a range of the possible mutual proportions of two fluids, and wherein the said scale cooperates with at least one proportion selection indicator marking located on the main body.

4. A fluid dispensing device, comprising:

a main body mounted to or comprising at least one fluid delivery channel, a volumetric selection mechanism, and an actuation mechanism configured to release an amount of liquid selected by the volumetric selection mechanism;

said volumetric selection mechanism and said actuation mechanism each being rotatable with respect to said main body on a first axis and tiltable relative to the said body on a second axis;

a clamping mechanism selectively fixedly holding said volume selection mechanism and said actuation mechanism in place relative to said main body;

said fluid delivery channel further comprising:

a fluid storage region further comprising at least a fluid ejection port and a control port;

a collapsible region which is in fluid communication with said fluid storage region and comprises a variable volume and a control cam surface;

wherein tilting about the said second axis of the said volumetric selection mechanism and said actuation mechanism causes ejection of at least one fluid from the said fluid storage region, due to interaction between said control cam surface and the said actuation mechanism.

5. The fluid dispensing device as claimed in claim **4**, wherein said volumetric selection mechanism and said actuation mechanism are bisected into a first and a second section by a tilt axis, and said first section further comprises a cut-away region which prevents contact with a control cam which comprises said control cam surface.

6. The fluid dispensing device of claim **5**, wherein said second section of said volumetric selection mechanism and said actuation mechanism comprise a ratio-metric proportion scale denoting a range of the possible proportions of two fluids using upper, lower and median ratio markings, and where said proportion scale is further placed on an exterior

side of said second section with at least one proportion indicator marker located on the main body.

7. A selection and actuation disc as claimed in claim **5**, wherein the said cut-away section bears a volumetric scale denoting progressively increasing shot volumes of a fluid, and where the said scale cooperates with at least one volume indicator marker located on the main body.

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